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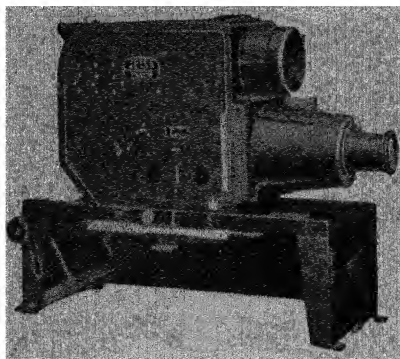
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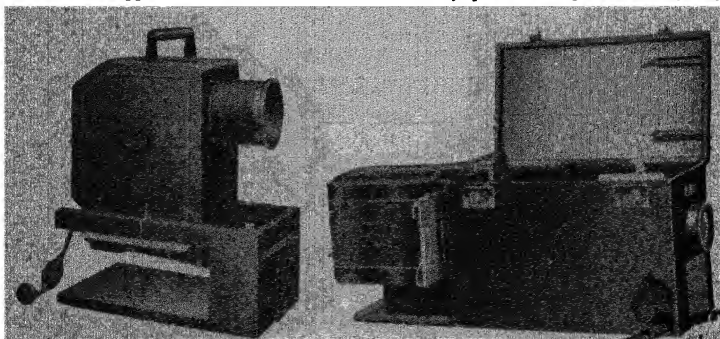
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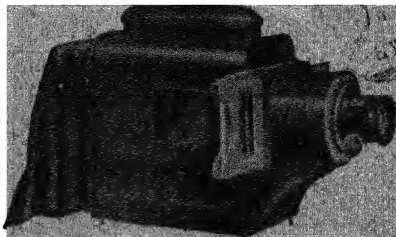
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TEACHING

A QUARTERLY TECHNICAL JOURNAL FOR TEACHERS

Editor - - H CHAMPION

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No. 2

A SUGGESTION FROM THE PROJECT METHOD

EVERY progressive teacher is familiar with the term 'Project Method' in teaching. He may not be acquainted with the detailed working, but he is expected to know that it is based on the activity and interests of children. Working on this method, one often feels the limitations of the class-system of teaching and also those resulting from the requirements of the Education Department and the university. Our schools, situated as they are at present, can hardly think of giving a trial to this method fair enough for its success or failure to be judged.

We had to teach Area and Volume to pupils of Standard Five. Problems on these topics given in textbooks are rather isolated, artificial, uninteresting and at times irrelevant. Considering the fact that we could not undertake any real project, as that of white-washing the walls, or building a walk or a hut in the school compound, we wondered if we could not borrow *something* from the Project Method. We decided to get an estimate of the cost of building a small house in one of the suburbs of Bombay. The results of this trial were satisfactory, and so the attempt, although very modest, is described here.

We began with a talk on the heavy rents in Bombay and what a tenant would wish if he had some money to spare. The conversation turned on the desirability of building a small hut, and we decided to estimate its cost. We considered the advantages and drawbacks of different suburbs, and chose a suitable one. We gathered some information, through a few members of the class, about the cost of land in that suburb. This led us to the size of the plot, the decision about which required some knowledge of the

laws and bye-laws of the town municipality, restricting the building to one-fourth the size of the plot. In this way we had to settle the area of the hut, in order that we could fix on the size of the plot.

After some discussion, we decided to have a hut with three rooms, of dimensions $16' \times 12'$, $12' \times 12'$ and $12' \times 10'$. During the discussion we saw how faulty our ideas of distance were, and we tried to correct these by estimating the dimensions of different rooms in the school building. We then discussed the arrangement of rooms and prepared a plan. Then we calculated the area covered under the building, and then the cost of the plot necessary. The cost of land varied from Rs. 3-8 to Rs. 10 per square yard, so we had to consider the merits and drawbacks of different types of plots. We decided to buy a plot at the rate of Rs. 5 per square yard.

Now we undertook the calculation of the cost of the building. We discussed various operations, such as digging the foundation, earth-filling, masonry work (brickwork, paving, whitewashing) and carpentry work. We found that it was not easy to get information about costs of building materials, wages of labourers, etc. We were also afraid that if we entered too much into detail we might run the risk of being side-tracked from the main problem. So we thought of calculating the cost on a contract basis, and discussed the way in which contracts are given. A copy of a tender with the relevant items only was produced, and cyclostyled copies were given to the pupils. This tender gave us sufficient material and guidance for calculation work.

The first item on the tender was the digging of the foundation. Here we came across the term 'cubic foot'. We learnt what a cubic foot meant and how volumes of rectangular solids could be found. We had to decide the depth of the foundation. In this we had to consider the height of the proposed hut and the nature of the soil in that suburb. The depth having been decided, we calculated the cost of digging.

Then came the building of the walls. We had to consider different stages in this: (1) hardening the bottom of the foundation, (2) building walls inside the foundation, (3) building outside it up to the plinth, and (4) brick walls above the plinth. We also discussed the thickness of the walls at different points. The tender helped us here, and some members of the class who had seen a house being built gave us valuable information. We calculated the cost of masonry work up to the plinth only. Then came the question of earth-filling, in which we took into account the quantity of earth we had taken out from the foundation.

While considering brick masonry work, we had to take into

account doors, windows, cupboards and niches. Having decided upon them, we calculated the cost of brick masonry work, doors and windows. The question of the roof, whether it should be slanting or flat, was very interesting. We decided upon a flat roof, which would enable us to construct an extra storey in future, if necessary, and calculated its cost. Purposely we did not allow pupils to provide for a slanting roof, as it would have required a knowledge of the theorem of Pythagoras, for which we were not quite prepared for want of sufficient time. Then we thought of the terrace at the top, and calculated the cost of paving it with tiles. We also calculated the cost of whitewashing, painting and paving the ground-floor.

All this took about 12 periods of 40 minutes each, and no further problems of the kind were solved. Pupils did the calculation work and recorded it methodically in their notebooks. Necessary information at various stages was given by the teacher. During discussion we were surprised at the amount of information pupils possessed. They told us about the varying thickness of walls at different points, that the area to be paved should be somewhat larger than the actual size of the rooms, that the extension of window sills into the walls would incur less masonry work. The pupils also knew a number of things about municipal bye-laws, the nature of tiles and stones for paving, the advantages of whitewashing over pointing the walls, etc.

The results of examination, so far as the problem on this topic was concerned, were as follows:

Class taught by the above method—out of 39 answers examined, 20 were quite satisfactory, 12 were just satisfactory, and 7 were hopeless.

Class taught by the usual method—out of 64 answers examined, 14 were quite satisfactory, 5 were just satisfactory, and 45 were hopeless.

A point by way of explanation. The class was handled by 12 different teachers under training, each one continuing his work with the class from where his predecessor had left off. The effect of such cumulative effort is clearly less satisfactory than it would have been if the class had been handled by a single teacher. On account of this, also, the work in the pupils' notebooks was not as satisfactory as it ought to have been—it was rather slovenly and careless.

The scheme has to a certain extent the spirit of the Project Method. The keen interest taken by the pupils in the incidental discussions, the amount of general knowledge they absorbed in the process, and the zeal displayed in working out problems of practical import, are all of much educative value. For a school working

under the limitations imposed by the traditional system of teaching, and for teachers who feel the need for more latitude and liberty in handling class subjects, such a method of teaching as that outlined above will prove interesting and effective.

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14. Painting, etc.	„ 5 per 100 sq ft.

L. R. DESAI

TEACHING THE USE OF ENGLISH. I

FOLLOWING are quotations from examiners' reports:

'Grammar was completely set at naught. The definite article—used in the wrong place and omitted from the right—was the commonest stumbling-block. "Look to" for "look at", "in" for "into", were among endemic howlers, while among epidemics may be noted the use of *as if* before a substantive (e.g. "she was as if his enemy").'—Bombay, Intermediate Arts, 1930.

'The use of the following phrases was habitual: "past so many days", "in the next day morning", "every day night", "past one month", etc. The following phrases were habitual: "came to know—he came by walk—go over there—drop a letter—give telephone—said him—no any letter—fear for."'—Madras, Secondary School Leaving Certificate Public Examination, 1931.

A scrutiny of examiners' reports in other Provinces would doubtless reveal the same weakness. Failure of the student to express himself accurately is indeed characteristic of English work in schools and colleges in all parts of India. It was doubtless this

widespread want of accuracy in the use of English that the Inter-University Board had in mind when it resolved 'that the universities be requested to state whether it is desirable to make some distinction in the B.A. course between a working knowledge of modern English and a study of English literature, and, if so, whether the former alone, or both, should be compulsory'.

It is not the purpose of this paper to enter into the controversy whether the average student is capable of acquiring a working knowledge of English, or whether ability to speak and write English is of greater or less importance to the average student than the ability to read English. The practical teacher has to take things as they are, and, in a country where English is the only medium of communication between the various language areas, the language of Government and the legislatures, where a command of English opens the door to higher general and professional education or to a career in business or a public department, it cannot be denied that it is the duty of the schools to give the average student a working knowledge of English, the knowledge and skill which will enable him to use accurately English words, phrases, idioms and grammatical constructions. If it is true that education should be kept in close contact with life, it is hardly worth while to reject the contention that ability to use English is secondary in importance to ability to read English. Without in any way belittling the value of reading ability, the practical teacher will do well first to reaffirm the fundamental value of the ability to use English, and, secondly, to ask himself whether he is doing all that lies in his power to give his pupils that essential command of English. When Intermediate students perpetrate such elementary solecisms as 'look to' for 'look at', 'in' for 'into', 'she was as if his enemy', that there is something radically defective in the teaching and learning of English in Secondary schools is a conclusion that cannot reasonably be avoided.

We have said—it will bear repetition—that an outstanding weakness in English teaching and learning lies in the failure to equip the student with a working knowledge, a command of English; in other words, with the ability to use correctly and readily English words, phrases and sentences. Let us try to trace this grave weakness to its source.

The Direct Method of teaching foreign languages, which made its appearance in the west between 30 and 40 years ago, found a ready acceptance in India. The old Translation-Grammar method, with its insistence on translation and grammar, was everywhere abandoned in favour of a method which, it was claimed, would produce increased correctness and fluency of expression in English.

The quotations at the head of this paper, the resolution of the Inter-University Board, and, we believe, the experience of thinking teachers, are accumulating evidence that the Direct Method, as it is practised in Indian schools, has failed to substantiate the claim put forward on its behalf; it is no exaggeration to say that the command of English possessed by the Secondary school pupil of today is no better than, if as good as, that possessed by the pupil trained under the old Translation-Grammar method.

To place the whole of the blame upon the Direct Method would be unjust. The widening of the 'broad highway' to higher education, the admission of pupils to Secondary schools who years ago would have been excluded as unfit, and the consequent lowering of examination standards, must undoubtedly share the blame. But the more the Direct Method as it is practised in Secondary schools is examined, the more will it be realized that the technique of the method, considered as a method of developing in the pupil the ability to use English correctly and readily, is far from perfect.

We have in several places made use of the phrase, 'the Direct Method as it is practised in India', thus implying that there is some peculiarity or distinctive feature in the Direct Method as applied and practised in Indian schools. It is a fact, not sufficiently realized in India, that among the adherents of the Direct Method in the west there are various schools of thought. All aim at establishing in the pupil the power of direct expression in the foreign language without the intervention of the mother-tongue, but not all follow the same teaching methods or use the same material. Some—the majority—use the Reader as the basis and chief instrument of teaching (the Reader as Centre); some prefer Grammar as Centre; others the Dialogue as Centre, while others believe that the pupil can best be trained to express himself correctly and freely by being required to do constant translation from and into the foreign tongue.¹ In India, on the other hand, the method of the Reader as Centre is everywhere followed. The study of the Reader occupies the bulk of the time assigned to English, and, in theory at least, the Reader is the 'centre' of, and provides the material for, the development of vocabulary, the study of grammar, and oral and written composition. We have said 'in theory', for actually no one series of English Readers has yet been compiled which, along with a suitable course of reading, provides at the same time suitable courses of vocabulary-training, grammar-study and composition.

¹ Authority could be cited in support of the views expressed by 'Scholemaster' in his letter to *TEACHING*, December 1928.

The first requisite in the preparation of an effective course of English study is what has been called 'the conscious organization of the facts of language'.¹ The 'facts of language' are all the words and word-combinations that make up the English language—words, phrases, sentences, idioms, grammatical usages. And the conscious organization of the facts of language means, first, the selection of such facts of language as serve best the ordinary and common needs of the learner who has to use the language; second, the arranging and grading of these facts in order of importance and difficulty.

This task has never been undertaken in its entirety, and it would be foolish to deny or under-estimate its magnitude. Indeed, in any discussion on the teaching of English in Indian schools we should remember that the science of foreign-language teaching is yet in its infancy. 'Methods and textbooks are based largely on guesses and assumptions.'² Again, a mastery of grammar, which deals with the structure of language, is vital to all linguistic study; but 'what this structure is we are only now beginning to find out. It is possible that future textbooks on English grammar will wear an air very strange to those brought up on "cases", "declensions", "conjugations", etc., that we shall hear of new parts of speech and much of "word-order", "token words", and the like. But a great deal still remains to be done first.'³ We shall not, therefore, be too critical of the Direct Method as it is practised, of the textbook writer who supplies material for its practice, or of the teacher who practises it, because of the failure to present to Indian students a complete and systematic course of English grammar.

All this is not to imply that the Direct Method as it is practised remains entirely unsystematized. The earlier books of some of the series of English Readers used in Indian schools do present a tolerably systematic and progressive course of grammar-study and of oral and written composition arising out of such grammar-study.

In the same connexion, of late there has sprung up a movement for the 'conscious organization of the facts of language' in respect of English vocabulary. In so far as this represents an attempt to reduce the heterogeneous vocabulary of English to some sort of order, it is a movement that will be welcomed by teachers. As it is at present proceeding, however, this movement is unlikely to

¹ H R Huse, *The Psychology of Foreign Language Study*, The University of North Carolina Press, p 84

² *Ibid.*, p. 7.

³ *The Teaching of English in England*, His Majesty's Stationery Office, London.

yield really beneficial results, for it has certain grave shortcomings. We refer to the Word Frequency movement, a movement which aims at classifying and grading English words according to the degree of commonness or frequency with which they occur in English writings—in other words, according to their importance to the learner.

Properly conceived, the problem of the classification and grading of vocabulary is the problem of classifying and grading language units. Various attempts have been made to define a unit of language: 'the linguistic unit is any group of sounds that a native speaker would practically never hesitate in the middle of, such as, "What's the good of . . ."' ; 'the unit of speech is the group of words that convey a thought';¹ words that have meanings 'which are quite independent of context'.²

The first is perhaps the most acceptable as being the clearest and most illuminating.

Every teacher is aware that there are certain groups of words which are composed of individual words so closely associated as to be inseparable, groups of words that a native speaker never hesitates in the middle of; e.g.

on the way ³	more or less
on shore	(learn) by heart
on land	in the event of
here and there	a month ago
on duty	since last Wednesday
under consideration	it is no use (do)-ing

This short list might be extended indefinitely.

The Word Frequency movement, founded as it is upon E. L. Thorndike's *Teachers' Word Book*, is concerned almost entirely with individual, disconnected words. Most of the Readers that attempt to present words in order of frequency confine themselves to individual, disconnected words; and in those Readers where a wider connotation is given to 'language units' only a perfunctory attempt is made to select and grade units of expression consisting of more than one word. But such groups of words as those listed above are as strictly units of expression as single words, and it is at least as necessary that the pupil should study and acquire a command of such groups of words as it is that he should study individual words. The neglect to treat such groups of words as

¹ *The Psychology of Foreign Language Study*, pp 88, 8.

² Michael West, *Language in Education*, p. 65

³ Re 'on the way', see West's *New Method Readers*, Supplementary Reader I B, p. 23.

units of expression leads inevitably to the errors quoted at the head of this paper. The Reader which prints in leaded type the word 'month', but ignores the phrase 'a month ago', is a Reader that has not visualized clearly the problems involved in the teaching of English vocabulary.

H. CHAMPION

(To be continued)

A NOTE ON THE TEACHING OF DECIMAL FRACTIONS

DECIMALS have not yet achieved in our schools the popularity which their simplicity demands. Teachers consider them difficult and neglect them or teach their pupils to change them into vulgar fractions, frequently making the process of working more difficult thereby. When working in decimals cannot be dispensed with, any artifice is adopted by which the supposed difficulty of the decimal point can be avoided. We cannot blame the children for this. The fault lies with the teachers—they are the real culprits.

The most obvious reason for unsatisfactory work in decimal fractions is that the four simple rules are taught mechanically. Teachers pay no attention to the fact that *our system of notation is a decimal system*; they do not teach the local values of figures or explain the processes of simple multiplication or division.

Multiplication by 10 is one of the most important points in school arithmetic. Success in the whole of the work in arithmetic to be studied and practised in school to a great extent depends on intelligent teaching of this step. The ten-times table is easily learned. It should then be employed to find products, e.g.

$$34 \times 10 = 340$$

From several such examples it should be discovered that the digits of the product are those of the multiplicand *promoted one place*—i.e. *moved one place to the left*. In the above example the 4 units of the multiplicand appear as 4 tens in the answer, the 3 tens become 3 hundreds. As there are no units, we write a cipher in the units place.

This idea of *promoting the digits* should be constantly emphasized rather than that of the mechanical affixing of the 0. The latter is an easy way for the teacher, but it leads nowhere.

This principle of promoting the digits in place-value in multiplying by 10 (and reducing the digits in place value in dividing by 10) is the key to facility in the short methods founded on decimals.

To multiply by 100 we promote the digits *two places*, and correspondingly for higher powers of 10.

Multiplication by Multiples of 10

A particular case is that of multiplication by multiples of 10, 100, etc.

Example: 6347×20

We multiply by 2 and *promote the digits one place*, thereby effecting also multiplication by the other factor ten. The units place must be filled by a cipher.

The General Case:

Example: 647×324

$$\begin{array}{r}
 647 \\
 324 \\
 \hline
 1941 \\
 1294 \\
 2588 \\
 \hline
 209628
 \end{array}$$

We multiply by the 3 (i.e. 300) and promote the digits two places; then we multiply by the 2 (i.e. 20) and promote the digits one place; and then we multiply by 4; the units figure and the place value of the digits does not change.

Until the pupils understand fully the place values of figures there is no use in teaching decimals. For example, in multiplying 173 by 63, they must know that the 7 multiplied by the 6 gives 42 hundreds, i.e. 4200, for a tens digit multiplicand multiplied by a *tens digit* gives hundreds.

A teacher, about to begin the teaching of decimals, should first test the pupils in the values of figures and should ensure that they understand them. When they do, he may begin decimals with some hope of success.

The following is a simple and natural method of approach to Decimal Notation and Decimal Methods.

To Teach 'Tenths'

The meaning of tenths can easily be explained with the aid of a ruler graduated in inches and tenths. When this has been done, the following steps will show how tenths are indicated:

(a) Consider the digits of the number 1111. Note that the value of the most important digit is 1000; that of the next is a tenth of a thousand—i.e. a hundred; that of the next a tenth of a hundred, i.e. a ten; that of the next a tenth of a ten, i.e. a unit.

(b) Then, what should be the value of a 1 written after the units place? Obviously a tenth of a unit.

(c) To mark the position of the units digit, a dot, called the 'decimal point', is placed between it and the tenths digit. Thus 11·1 inches means ten inches and one inch and a tenth of an inch. This could not be written simply 111 inches, for this would mean a hundred inches, ten inches, and one inch. Hence the necessity of indicating the units digit, which is done by means of the decimal point.

When the meaning and notation of tenths are understood, the pupils should be given practice in their use by the usual practical method of drawing and measurement. In reading numbers the term 'tenths' should be used, instead of *point one*, *point two*, etc.

To Teach 'Hundredths'

When 'tenths' are clearly understood, the teacher may proceed to teach 'hundredths'. For this purpose the most useful aids are paper squared in inches and tenths, or the metre-stick showing centimetres.

With the square inch we can show in concrete form the unit, the tenth and the hundredth. Many useful exercises can be based on this alone. Thus, we can illustrate:

$$1 \text{ unit} = 10 \text{ tenths} = 100 \text{ hundredths}$$

$$1 \text{ tenth} = 10 \text{ hundredths}$$

For notation of hundredths the method shown above for tenths may be continued. Thus in 1111·11 inches, the 1 written after the 1 tenth would mean a tenth of a tenth, which is a hundredth.

We have with the square inch a means of showing any decimal of two places. The children can show graphically ·27, ·35, ·89, etc.; they can add and subtract these and note simple equivalents such as:

$$\frac{1}{2} = \cdot 5 = \text{i.e. 5 tenths or 50 hundredths.}$$

$$\frac{1}{4} = \cdot 25 = 25 \text{ hundredths } (\frac{3}{4} = 75 \text{ hundredths}).$$

$$\frac{1}{20} = \cdot 05 = 5 \text{ hundredths.}$$

The illustration of the square inch, giving hundredths, is invaluable later in showing the intimate relation of hundredths to percentage.

When the meaning of tenths and hundredths is clearly understood, a good deal of practice should be given in the writing and reading of numbers correctly. For example, 43·45 can be read forty-three, four tenths, five hundredths, or forty-three and forty-five hundredths, but never forty-three point forty-five.

At this stage addition, subtraction, multiplication and division, with numbers containing tenths and hundredths, may be taught before proceeding to thousandths and figures of smaller value. To teach 'thousandths', etc., later on, it may not be necessary to continue the same detailed and concrete treatment. The pupil may be able to continue the idea of decimals to any number of places.

Addition and Subtraction

Addition and subtraction should give no trouble. The only point to emphasize is that digits having the same place value must be written carefully under one another—tens under tens, units under units, tenths under tenths, etc. Squared paper is useful at the beginning.

Example (a). Addition:

$$\begin{array}{r} 64\cdot31 \\ 280 \\ 6\cdot29 \\ 17\cdot03 \\ 5\cdot9 \\ \cdot83 \\ \hline 374\cdot36 \end{array}$$

Example (b). Subtraction:

$$\begin{array}{r} 435\cdot1 \\ 68\cdot73 \\ \hline 366\cdot37 \end{array}$$

Multiplication of Decimals

By integers, e.g. $32\cdot45 \times 7$. This seldom presents any difficulty. The work is identical with short multiplication with whole numbers.

$$\begin{array}{r} 32\cdot45 \\ 7 \\ \hline 227\cdot15 \end{array}$$

The process of working is as follows: $5 \text{ hundredths} \times 7 = 35 \text{ hundredths}$, i.e. 3 tenths and 5 hundredths. Write down the 5 hundredths in the hundredths place and carry the 3 tenths to the tenths place. $4 \text{ tenths} \times 7 = 28 \text{ tenths}$; adding the 3 tenths we get 31 tenths, i.e. 3 units and 1 tenth. Write down the 1 tenth in the tenths place and carry the 3 units to the units place, etc.

Of vital importance is the multiplication of decimals by 10, 100,

1000, etc. If the method shown earlier in this note for whole numbers is adopted, this step should be easy.

Example (a)

Multiply $43\cdot6 \times 10$

$$\begin{array}{r} 43\cdot6 \\ 10 \\ \hline 436\cdot0 \end{array}$$

It will be noted that the digits remain unchanged, but each is promoted one place. The mental process is as follows: 6 tenths $\times 10 = 60$ tenths, i.e. 6 units; write down 6 in the unit place; 3 units $\times 10 = 30$ units, i.e. 3 tens; write the 3 in the tens place; four tens $\times 10 = 400$; write the 4 in the hundreds place.

Example (b)

Multiply $23\cdot45 \times 10$

$$\begin{array}{r} 23\cdot45 \\ 10 \\ \hline 234\cdot5 \end{array}$$

The process of calculation is: 5 hundredths $\times 10 = 50$ hundredths, i.e. 5 tenths; write the 5 in the tenths place; 4 tenths $\times 10 = 40$ tenths, i.e. 4 units; write the 4 in the units place, etc. It will be noted, as before, that the digits do not change, but each is promoted one place.

Example (c)

Multiply $45\cdot67 \times 100$

$$\begin{array}{r} 45\cdot67 \\ 100 \\ \hline 4567\cdot \end{array}$$

The process of calculation is: 7 hundredths $\times 100 = 700$ hundredths, i.e. 7 units; write the 7 in the units place; 6 tenths $\times 100 = 600$ tenths, i.e. 6 tens; write the 6 in the tens place, etc. Note that each figure is promoted two places and that the digits do not change.

From a few examples it will be seen that multiplying by 10 simply means promoting each digit one place; multiplying by 100 means promoting each digit two places; and multiplying by 1000 means promoting each digit 3 places, etc.

This principle of fundamental importance may be effectively impressed on pupils by the use of some such simple apparatus as the following:

A	· (Decimal point)					B
	8	6	4	3	7	5

The diagram shows a strip of paper, divided into equal squares and running on a thread, AB, stretched across the blackboard. The strip bears a series of digits, while the dot, or decimal point, is written on the blackboard above the strip.

The strip having been set as in the diagram, the pupils should read the place values of the digits. To multiply by 10 we slide the strip along one place to the left. The pupils should now read the value of the resulting number. Similarly, to multiply by 100 we slide the strip two places to the left, and to multiply by 1000 we slide the strip three places to the left. Care should be taken in each case to explain the mental processes.

The diagram may also be used to illustrate division by 10 and powers of 10, by sliding the strip to the right and explaining the mental processes.

Multiplication and division by 10, 100, etc., should be taught till every pupil can perform the work mechanically. When pupils are proficient in this step they are ready to proceed to multiplication of decimals by decimals.

Assuming that the pupils understand fully multiplication of decimals by 10 and powers of 10, we may now begin to teach multiplication of decimals by whole numbers of two or more digits and multiplication of decimals by decimals.

Example (a)

Multiply 4.32×20

$$\begin{array}{r} 4.32 \\ 20 \\ \hline 86.4 \end{array}$$

Since $20 = 2 \times 10$ we multiply 4.32 by 2, and then multiply the result by 10; since the last step is performed mentally by moving every digit in the product 4.32×2 one place to the left, the two steps are taken together and the result is written down at once as shown above.

Similarly, for any tens digits the method of multiplication is just the same as in simple multiplication, i.e. multiply by the digit and move all figures one place to the left.

Example (b)

Multiply 14.32×34

$$\begin{array}{r} 14.32 \\ 34 \\ \hline 429.6 = 14.32 \times 30 \\ 57.28 = 14.32 \times 4 \\ \hline 486.88 = 14.32 \times 34 \end{array}$$

Since $34 = 30 + 4$ we multiply 14.32 first by 30 and then by

4, and add these two products to get the result. As we already know how to multiply a decimal by any number up to 9 and also by any number which is a multiple of 10, there is nothing new in this example.

Note: From the last two examples it will be noticed that when the *units figure of the multiplier* is placed *underneath the last figure of the multiplicand*, the first figure to be set down in each partial product falls immediately below the multiplying figure that produced it. Thus, in the last example, 2 hundredths multiplied by 30 (3 tens) give six tenths, which comes immediately under the multiplier 3 (i.e. 3 tens or 30), and 2 hundredths multiplied by 4 units give 8 hundredths, which comes immediately under the multiplier 4. By means of this arrangement of the multiplier, pupils can get the correct result easily without danger of a mistake, though they should also understand clearly the value of every figure in the product.

Taking the last example again, the full mental process is as follows:

$$\begin{array}{r}
 14.32 \\
 \quad 34 \\
 \hline
 429.6 \\
 \quad 57.28 \\
 \hline
 486.88
 \end{array}$$

First multiplying by 3 tens (30): 2 hundredths \times 3 tens give 6 tenths, write the 6 in the tenths place; 3 tenths \times 3 tens give 9 units, write the 9 in the units place; 4 units \times 3 tens give 12 tens, i.e. one hundred and 2 tens, write the 2 in the tens place and carry the 1 to the hundreds place; 1 ten \times 3 tens give 3 hundreds, adding the 1 hundred carried over we get 4 hundreds, write this in the hundreds place. Then multiplying by 4 units: 2 hundredths \times 4 = 8 hundredths, write the 8 in the hundredths place; 3 tenths \times 4 = 12 tenths, i.e. one unit and 2 tenths, write the 2 in the tenths place and carry the 1 to the units place; 4 units by 4 = 16 units, adding the 1 unit carried over, we get 17 units, write the 7 in the units place and carry the 1 to the tens place; one ten \times 4 = 4 tens, adding the one carried, we get 5 tens, write the 5 in the tens place. Then add up the two products.

To Multiply a Whole Number by a Tenth's Digit

Example (a)

$$\text{Multiply } 437 \times .1$$

Since there is no unit figure in the multiplier we may write it as .1. Arranging the multiplier so that the units figure is placed

just under the last figure of the multiplicand, we proceed as follows:

$$\begin{array}{r} 437\cdot \\ \cdot 1 \\ \hline 43\cdot 7 \end{array}$$

Explanation: 7 units \times 1 tenth = 7 tenths, because this means 1 tenth of 7, write the 7 in the tenths place; $30 \times \cdot 1$, i.e. one tenth of 30 = 3 units, write the 3 in the units place; $400 \times \cdot 1$, i.e. 1 tenth of 400 = 40, write the 4 in the tens place.

From the above it will be noted that when we multiply by 1 tenth the digits are exactly the same as those of the multiplicand, but each is removed one place to the right. Thus, above, 7 units become 7 tenths, 3 tens become 3 units and 4 hundreds become 4 tens.

Example (b)

Multiply $437 \times \cdot 7$

Since $\cdot 7 = 1 \text{ tenth} \times 7$ we obtain the product by multiplying by 7 and then by the other factor $\cdot 1$ (1 tenth), i.e. by moving each digit of the product 437×7 one place to the right.

$$\begin{array}{r} 437\cdot \\ \cdot 7 \\ \hline 305\cdot 9 \end{array}$$

The mental process is as follows: 7 units \times 7 tenths = 49 tenths, i.e. 4 units and 9 tenths, write the 9 in the tenths place and carry the 4 to the units place; 3 tens by 7 tenths = 21 units, adding the 4 carried over we have 25 units, write the 5 in the units place and carry the 2 to the tens place; 400 by 7 tenths = 28 tens, adding the 2 carried we get 30 tens, i.e. 300.

To Multiply by a Hundredths Digit

Example (a)

Multiply $437 \times \cdot 01$

$$\begin{array}{r} 437\cdot \\ \cdot 01 \\ \hline 4\cdot 37 \end{array}$$

Since there is no units figure we may write the multiplier as $\cdot 01$. Placing the units figure of the multiplier under the last figure of the multiplicand, we proceed as above. The mental process is as follows:

Seven hundredths, write the 7 in hundredths place; 3 tenths = 3 tenths, write the 3 in the tenths place; $400 \times 1 \text{ hundredth} = 4$ units, write the 4 in the units place.

From the above it will be seen that when we multiply by $\cdot 01$ (one hundredth), we get exactly the same digits as those of the multiplicand, but each is moved two places to the right.

Example (b)

Multiply $437 \times \cdot 02$

Since $\cdot 02 = 2 \times \cdot 01$, we get the product by multiplying by 2 and then by $\cdot 01$, i.e. we multiply by 2 and then move all the digits two places to the right.

$$\begin{array}{r} 437 \\ \cdot 02 \\ \hline 8\cdot 74 \end{array}$$

By placing the units figure of the multiplier under the last figure of the multiplicand the work may be done in one process as above. 7 units by 2 hundredths = 14 hundredths, i.e. one tenth and 4 hundredths, write the 4 in the hundredths place and carry the 1 to the tenths place; 3 tens \times 2 hundredths = 6 tenths, adding the 1 carried we get 7 tenths, write this in the tenths place; four hundred \times 2 hundredths = 8 units, write the 8 in the units place.

To Multiply a Decimal by a Decimal

Example (a)

Multiply $\cdot 4$ by $\cdot 1$

$$\begin{array}{r} \cdot 4 \\ \cdot 1 \\ \hline \cdot 04 \end{array}$$

As in the case of multiplication of whole numbers by $0\cdot 1$, the multiplication is done merely by moving the digits of the multiplicand one place to the right. The work is set out as above. The mental process is:

4 tenths \times 1 tenth = 4 hundredths, place the 4 in the hundredths place.

Example (b)

Multiply $\cdot 36 \times \cdot 4$

$$\begin{array}{r} \cdot 36 \\ \cdot 4 \\ \hline \cdot 144 \end{array}$$

As in the case of multiplication of whole numbers by a tenths digit, multiply by 4 and move the figures one place to the right. The mental process is:

6 hundredths \times 4 tenths = 24 thousandths, i.e. 2 hundredths and 4 thousandths, write 4 in the thousandths place and carry the

2

2 to the hundredths place; 3 tenths \times 4 tenths = 12 hundredths, adding 2 hundredths carried over we get 14 hundredths, i.e. 1 tenth and 4 hundredths, write 4 in the hundredths place and 1 in the tenths place.

Example (c)

$$\begin{array}{r} \text{Multiply } .36 \times .01 \\ .36 \\ \cdot 01 \\ \hline .0036 \end{array}$$

As in the case of whole numbers, to multiply by $\cdot 01$ we merely move the digits of the multiplicand 2 places to the right. 6 hundredths \times 1 hundredth = 6 ten-thousandths, write 6 in the ten thousandths place; 3 tenths \times 1 hundredth = 3 thousandths, write 3 in the thousandths place.

Example (d)

$$\begin{array}{r} \text{Multiply } .36 \times .04 \\ .36 \\ \cdot 04 \\ \hline .0144 \end{array}$$

Multiply $\cdot 36 \times 4$ and move the digits two places to the right for $\cdot 04 = 4 \times \cdot 01$.

TO MULTIPLY BY WHOLE NUMBERS AND DECIMALS

Practice should be given to the pupils in multiplication with single figures in tenths and hundredths till they understand the process fully. When they do, they may be taught multiplication with multipliers consisting of whole numbers and decimals.

Example (a)

$$\begin{array}{r} \text{Multiply } 3.2 \times 2.3 \\ 3.2 \\ 2.3 \\ \hline 6.4 \\ \cdot 96 \\ \hline 7.36 \end{array}$$

Place the units figure 2 of the multiplier under the last figure of the multiplicand, and proceed to multiply by each figure of the multiplier, as shown with separate figures in the preceding exercises. The full mental process is as follows; 2 tenths \times 2 units = 4 tenths, write this in the tenths place; 3 units by 2 units = 6 units, write 6 in the units place; 2 tenths \times 3 tenths = 6 hundredths, write 6 in the hundredths place; 3 units \times 3 tenths = 9 tenths, write 9 in the tenths place; add up the two partial products.

From the above example it will be noticed that here also, when the work is so arranged that the units figure of the multiplier is placed under the last figure of the multiplicand, the first figure to be set down in the product falls directly below the multiplying figure that produced it.

Example (b)

Multiply 25.45×23.45

$$\begin{array}{r}
 25.45 \\
 23.45 \\
 \hline
 509.0 \\
 76.35 \\
 10.180 \\
 1.2725 \\
 \hline
 596.8025
 \end{array}$$

Since the multiplier $23.45 = 20 + 3 + .4 + .05$, we have to multiply separately by 20, by 3, by .4 and by .05, and finally to add the partial products.

Since we already know how to multiply a decimal by an integer or by such simple decimal numbers as .4 and .05, it will be seen there is practically nothing new in this operation. The work may be arranged as above, with the units figure of the multiplier under the last figure of the multiplicand, thus the first figure to be set down in each partial product will fall directly below the multiplying figure that produced it.

Explanation: We begin the multiplication with the digit of the highest order, i.e. 2 on the extreme left (which is equal to 20) and then proceed with the multiplying digits in succession from left to right.

N.B.—On comparing the number of decimal figures in the multiplicand, the multiplier, and the product in each of the above examples, it will be noticed that the number of decimal figures in the product is always equal to the sum of the numbers of decimal figures in the multiplicand and the multiplier.

We may now lay down the following rules for the multiplication of decimals.

1. Write down the multiplier such that its units figure may be under the last figure (on the right) of the multiplicand.
2. Multiply the upper number by each figure of the multiplier, beginning with that on the extreme left and then proceeding with the figures in succession from left to right.
3. Write down each partial product so that its first figure may be under the figure of the multiplier which produced it, and its decimal point immediately under the decimal point of the multiplicand.

4. Finally add all the partial products together, and the sum so obtained will give the product required.

Note. In order to detect any large mistake, especially the misplacement of the decimal point, it is very desirable to make a rough estimate of the required product before multiplying, so that we may know beforehand what sort of result to expect.

In the last example above, for instance, the multiplicand is a little over 25, and the multiplier a little over 23; the product should thus be somewhere near 575, which gives a rough estimate of the product and confirms the position of the decimal point in our actual product 596·8025.

Example (c)

Multiply 66·28 by ·027.

Rough estimate: Here the multiplier is just a little under ·03, and the multiplicand a little over 66; hence, for the purpose of making a rough estimate, we may take the multiplier as ·03 and the multiplicand as 66; therefore the product should be about 2.

Now, proceeding according to the rule arrived at above, we may set down the working as follows:

$$\begin{array}{r}
 66\cdot28 \\
 \times 0\cdot027 \\
 \hline
 1\cdot3256 \\
 46396 \\
 \hline
 1\cdot78956
 \end{array}$$

N.B. In the early stages pupils should not be given large numbers. What is required at this stage is a thorough grounding in principles. When the principles are fully grasped and the values of figures are clearly understood, pupils will find no difficulty with large numbers later.

Division of Decimals

(a) DIVISIONS BY INTEGERS UP TO TWELVE

There is no difficulty here. We proceed as in ordinary division, bearing in mind the place value of each digit in the dividend. 'The grouping method' is perhaps easiest at first.

Example 1

Divide 54·32 by 4.

Since $54\cdot32 = 5 \text{ tens} + 4 \text{ units} + 3 \text{ tenths} + 2 \text{ hundredths}$ we may arrange the working as follows in the early stages:

$$\begin{array}{l}
 4) \text{ 5 tens} + 4 \text{ units} + 3 \text{ tenths} + 2 \text{ hundredths} \\
 \underline{1 \text{ tens} + 3 \text{ units} + 5 \text{ tenths} + 8 \text{ hundredths}}
 \end{array}$$

Explanation: 5 tens $\div 4 = 1$ group of 4 tens and 1 ten over. 1 ten = 10 units; adding 4 units we have 14 units. Dividing by 4, we get 3 groups of 4 units and 2 units over. Two units = 20 tenths, adding 3 tenths we have 23 tenths. Dividing by 4, we get 5 groups of 4 tenths and 3 tenths over.

3 tenths = 30 hundredths, adding 2 hundredths we have 32 hundredths. Dividing 32 hundredths by 4 we get 8 groups of 4 hundredths.

When the pupils understand the process, the work may be briefly set down as follows:

$$\begin{array}{r} 4) 54 \cdot 32 \\ \underline{13} \end{array}$$

Example 2

$$\begin{array}{r} \text{Divide } .0056 \div 8 \\ 8) 0 \cdot 0056 \\ \underline{0007} \end{array}$$

Here in the quotient there can be no units, no tenths, and no hundredths.

5 thousandths divided by 8 gives 0 thousandths. 5 thousandths = 50 ten-thousandths, adding the 6 ten-thousandths we have 56 ten-thousandths. 56 ten-thousandths $\div 8$ gives 7 ten-thousandths.

Example 3

$$\begin{array}{r} \text{Divide } .74 \div 8 \\ 8) \cdot 7400 \\ \underline{0925} \end{array}$$

Here on dividing 74 hundredths by 8 we get 9 hundredths and 2 hundredths over. If now we add ciphers to the right of the dividend (thereby making no change in the value) we are able to carry on the division till it terminates. Thus 2 hundredths = 20 thousandths. Dividing by 8 we get 2 thousandths as quotient and 4 thousandths over. 4 thousandths = 40 ten thousandths. 40 ten thousandths $\div 8$ gives 5 ten thousandths as quotient and no remainder.

Example 4

$$\text{Divide } 435 \cdot 564 \div 36$$

Since $36 = 4 \times 9$ we may proceed as in the example given above, dividing 435.564 by 4 and then the resulting quotient by 9.

The work is shown below:

$$\begin{array}{r} 36 (4) 435 \cdot 564 \\ (9) 108 \cdot 891 \\ \underline{12 \cdot 099} \end{array}$$

(b) DIVISION BY 10, 100, 1000 AND THEIR MULTIPLES, E.G.
20, 400, ETC.

We have already seen that we can multiply a decimal by 10, 100, 1000 by promoting the digits one, two or three places respectively. We can divide any number by 10 by moving the digits one place to the right.

$$\text{Thus } 230 \div 10 = 23$$

The hundreds digit becomes a tens digit and the tens digit becomes a units digit.

$$23 \div 10 = 2.3$$

$$2.3 \div 10 = .23$$

$$.23 \div 10 = .023$$

To divide by 100 we move the digits two places to the right.
Thus:

$$234 \div 100 = 2.34$$

$$23.4 \div 100 = .234$$

$$2.34 \div 100 = .0234$$

$$.234 \div 100 = .00234$$

To divide by 1000 we move all the digits three places to the right. Thus:

$$2345 \div 1000 = 2.345$$

$$234.5 \div 1000 = .2345$$

$$23.45 \div 1000 = .02345$$

The meaning of the above should be quite clear from the practice previously given in multiplication. A few examples will suffice to test whether the pupils understand the process: e.g.

$$234 \div 100 = 2.34$$

Explanation: 2 hundreds $\div 100 = 2$ units

3 tens $\div 100 = 3$ tenths

4 units $\div 100 = 4$ hundredths

When the pupils can divide by 10, 100, 1000, etc., mechanically, division by multiples of these numbers may be taught.

Example 5

Divide 252.45 by 500

Since $500 = 5 \times 100$, we can divide the dividend first by 100 and then the resulting quotient by 5 as shown below:

$$500 (100) \overline{) 252.45}$$

$$(5) \overline{) 2.5245}$$

$$.5049$$

After a little practice we can take the two steps together, and write down the result at once in one line.

$$\begin{array}{r} 500) 252\cdot45 \\ \underline{5049} \end{array}$$

All that is necessary is to divide by 5 and move each digit in the quotient two places to the right.

(c) DIVISION BY WHOLE NUMBERS WHICH ARE NEITHER RESOLVABLE INTO FACTORS NOR ARE MULTIPLES OF 10, 100, 1000, OR/AND DIVISION BY NUMBERS CONTAINING DECIMALS.

In such cases we adopt what is known as the Standard Method of Division.

N.B. A number is said to be in the standard form when it has only *one integral digit*. For example, 4·32, and 9·087 are in the standard form, while 43·2 and ·432 are not. In the standard method of division we reduce the divisor to the standard form in every case, and make a corresponding change in the dividend.

The method will be clear from the following examples:

Example 6

Divide $373\cdot75 \div 23$.

To reduce 23 to the standard form we divide it by 10 (as we divide it by 10 so we must also divide $373\cdot75$ by 10). We set down the work as under:

$$\frac{373\cdot75}{23} = \frac{373\cdot75 \div 10}{23 \div 10} = \frac{37\cdot375}{2\cdot3}$$

(*N.B.* Multiplying or dividing the dividend and the divisor by the same number will not change the value of the quotient.)

Now we can easily calculate the number of integral figures in the quotient. The divisor is 2 + a fraction, and the dividend is 37 + a fraction, therefore by trial we see that the number of integral digits in the quotient will be two and that the quotient will be about 18.

16·25 We proceed as in ordinary division, by the long
2·3) 37·375 method, as if both divisor and dividend were whole
23 numbers, placing each figure in the quotient in its
143 proper place according to its place-value, and putting
138 the decimal point of the quotient immediately over
that of the dividend.

57
46 *Pupils should be made to understand the place value*
115 *of every figure they write down; e.g. take the last sub-*
115 *trahend in the last example. It looks like 115, but it*
is really ·115. It is obtained as follows: 3 tenths \times 5
hundredths in the quotient = 15 thousandths. Write

the 5 in the thousandths place and carry the 1 to the hundredths

place; 2 units by 5 hundredths = 10 hundredths, then with the 1 hundredth carried = 11 hundredths or 1 tenth and 1 hundredth. The whole is thus $\cdot 115$.

Example 7

$$\begin{array}{r} \text{Divide } 4\cdot4672 \div \cdot064 \\ 4\cdot4672 \quad 4\cdot4672 \times 100 = 446\cdot72 \\ \cdot064 \quad \cdot064 \times 100 = 6\cdot4 \end{array}$$

Explanation: To have one integral figure in the divisor we have to multiply it by 100, i.e. move all the digits two places to the left. This gives $6\cdot4$ as the new divisor in the standard form.

In order that the quotient may be correct we must also multiply the dividend by 100; it then becomes $446\cdot72$. Since the new divisor is $6\cdot4$, a little over 6, and the new dividend is a little less than 447, it is obvious that the quotient will have two integral figures, and that the integral part will be something about 70.

$$\begin{array}{r} 69\cdot8 \\ 6\cdot4 \overline{)446\cdot72} \\ \underline{384} \\ 627 \\ \underline{576} \\ 512 \\ \underline{512} \end{array}$$

We now proceed with the work as in Example 6. The pupils should be asked to give the correct value of the figures in each subtrahend, and to show how they are obtained.

For example, the figures 576 in the second subtrahend are really $57\cdot6$. They are obtained as follows: 4 tenths \times 9 units = 36 tenths or 3 units and 6 tenths; 6 units \times 9 units = 54 units. Add the 3 units carried and we get 57 units, or 5 tenths and 7 units.

Example 8

$$\begin{array}{r} \text{Divide } 39\cdot151 \div 164\cdot5 \\ 39\cdot151 \quad 39\cdot151 \times 100 = 3915\cdot1 \\ \underline{164\cdot5} \quad \underline{164\cdot5 \times 100 = 16450} \end{array}$$

Since the new divisor in the standard form lies between 1 and 2, and the new dividend is nearly $\cdot4$, or 4 tenths, we see by trial that the first figure in the quotient will be in the tenths place.

$$\begin{array}{r} 0\cdot238 \\ 1\cdot645 \overline{)0\cdot391510} \\ \underline{3290} \\ 6251 \\ \underline{4935} \\ 13160 \\ \underline{13160} \end{array}$$

The working on the left will make the procedure clear.

Example 9

Divide $7.2348 \div .008$

$$\frac{7.2348}{.008} = \frac{7.2348 \times 1000}{.008 \times 1000} = \frac{7234.8}{8} = 904.35$$

Here we divide by 8 mentally, or by the short division method.

Example 10

Divide 7.624 by 284.3 to 3 places of decimals, and *find the true remainder*.

$$\begin{array}{r} 7.624 \div 284.3 = \frac{7.624 \div 100}{284.3 \div 100} = \frac{.07624}{2.843} \quad \begin{array}{l} \text{(New Dividend)} \\ \text{(New Divisor)} \end{array} \\ \cdot 026 \\ 2.843 \cdot 076240 \\ 5686 \\ 19380 \\ 17058 \\ 2322 \end{array}$$

To find the true remainder:

Since in the last operation in example 10 above, the divisor 2.843 has been multiplied by the last figure 6 of the quotient, i.e. $\cdot 006$, it is clear that the product must contain 6 decimal figures ($\cdot 003 \times \cdot 006 = \cdot 000018$). Thus the remainder written above as 2322 is actually $\cdot 002322$. But since the new divisor and the new dividend are each $\frac{1}{100}$ part of the original divisor and dividend, the remainder obtained is also $\frac{1}{100}$ part of the true remainder. Therefore, the true remainder $= \cdot 002322 \times 100 = \cdot 2322$.

In the standard form of division, as soon as pupils have understood the principles of reducing the divisor to the standard form, the intermediate steps of finding the new divisor and dividend may be dropped, e.g.

$$\cdot 074326 \div \cdot 0067 = 74.326 \div 6.7$$

can be written down at once without going through the actual process of multiplying divisor and dividend by 1000.

Multiplication with the Multiplier in the Standard Form

Multiplication with the multiplier in the standard form is necessary for contracted work in decimals, but the method of multiplication I have already shown is easier in the early stages. When pupils have grasped the principles fully, there will be no difficulty in teaching the standard form later.

The principle of the standard form of multiplication is best explained by using whole numbers at first.

$$\text{e.g. (i) } 640 \times 20 = 6400 \times 2$$

Here we divide the multiplier by 10, so as to have one integral figure only, $20 \div 10 = 2$. Now since the new multiplier is only $\frac{1}{10}$ of the original multiplier, we must multiply the original multiplicand 640 by 10 to get the correct answer; the new multiplicand thus becomes 6400.

$$\text{(ii) } 6400 \times 200 = 640000 \times 2$$

Here we divide the multiplier by 100 and multiply the multiplicand by 100 to get the correct form before multiplying.

$$\text{(iii) } 640 \times \cdot 02 = 6\cdot 4 \times 2$$

Here we multiply the original multiplier by 100 to get the standard form, so we must divide the original multiplicand by 100.

The following examples show clearly how to multiply decimals using the standard form of multiplication.

(a) Multiply 29·237 by 29·237.

Step (1): Reduce the multiplier to the standard form by dividing by 10; it thus becomes 2·9237.

Step (2): Since we have now reduced the multiplier to $\frac{1}{10}$ of its original value, we must increase the multiplicand to ten times its original value, i.e. we must multiply it by 10; it then becomes 292·37.

We set out the work as follows:

$$\begin{array}{r}
 29\cdot 237 \times 29\cdot 237 \\
 = 292\cdot 37 \times 2\cdot 9237 \\
 \begin{array}{r}
 292\cdot 37 \\
 2\cdot 9237 \\
 \hline
 584\cdot 74 \\
 263\cdot 133 \\
 5\cdot 8474 \\
 \cdot 87711 \\
 \cdot 204659 \\
 \hline
 854\cdot 802169
 \end{array}
 \end{array}$$

(Note that the *units figure* in the multiplier must always be placed under the last figure of the multiplicand.)

(b) Find the product of $278\cdot 3 \times \cdot 000072$.

Here the multiplier must be multiplied by 100,000 to reduce it to the standard form. Hence the multiplicand must be divided by 100,000 to compensate for this.

$$\begin{array}{r}
 278.3 \times .000072 \\
 = .002783 \times 7.2 \\
 \begin{array}{r}
 .002783 \\
 7.2 \\
 \hline
 .019481 \\
 .0005566 \\
 \hline
 .0200376
 \end{array}
 \end{array}$$

The advantages of teaching this standard form of multiplication are:

1. Since the multiplier contains only one integral figure it is easy to get a rough estimate of the answer.
2. The standard form is essential for contracted methods of multiplication.

N.B. As this note has been written for teachers who are supposed to be proficient in decimals already, I have gone rapidly from step to step. In teaching pupils, teachers must go more slowly and care must be taken that pupils thoroughly understand each step before proceeding to the next.

P. B. QUINLAN

DRAMA FOR THE TEACHER

'PLEASE explain to us how we can use the dramatic method in teaching.' 'How is it possible for me to use drama in my classes?' 'We've been reading of the excellent results some teachers in western schools are able to get by teaching their history and geography through drama; but can you tell us how it works?'

These and many similar questions have found their way to my desk for a number of years. Answers vary, of course, according to the position of the schools. And at present, in the average school, one must admit that the enterprising school teacher is up against odds.

Explanations of the methods used in many western schools with great effect soon bring forth an array of stumbling-blocks enough to discourage anyone. Teaching through the drama is practically a project. For instance, some special period of history is chosen, books read, pictures studied; a dramatic version written; costumes designed and made; stage properties prepared; and eventually the whole school gathers to see the little play acted. The project includes history, drawing, sewing, English, manual training and even arithmetic in keeping accounts. The scheme

outlined thus far meets with difficulties. They are many: the school curriculum is so full that it is impossible to do anything extra; the teacher must push the students in order to get through the required amount of work; the inspectors are severe; the children are for the most part ill-fed and under-nourished, some of them walking several miles to school after a scanty morning meal, doing without any noon-day meal, and returning the several miles home to an unbalanced supper; they have no time or strength for any after-school work; dramatics require a certain amount—even though small—of money for costumes and staging, which the school cannot grant, and toward which the pupils are too poor to contribute even a pie; the average libraries are so limited that reference books are wholly unavailable. So the difficulties mount up, until a good idea is turned aside as impracticable and impossible for the village school, teacher and pupil.

Results From Dramatic Teaching

The stumbling-blocks are mountainous, it is true, yet it is wrong to put aside a good idea without making every effort to get something constructive from it. Let us consider just what we would like to gain, or what it is possible to gain from the 'drama way'. To quote Sheldon:¹ 'Every child loves to pretend. And the whole art of acting is nothing more nor less than pretending to be somebody else. Of course children will, if left to themselves, make up their own plays. This is advantageous in several ways. It stimulates the imagination, wipes away self-consciousness and develops self-reliance.'

An illuminating story is told by Miss Knox.² Some teachers and a layman visited a school to observe a lesson in history. The lesson happened to be on colonial government in New England, and the pupils enacted the incident of hiding the charter of Connecticut in the oak tree. The lesson was so impressed on the minds of all, old and young, that they never could forget it. Outside the classroom, however, the layman said, 'That was a fine play. The children knew how to speak and how to look angry and to govern, but what has all this to do with learning their lesson? You said I was to see history taught. Is that teaching? They seemed only to play.' A famous teacher who was present answered: 'You have seen today the difference between formal teaching and real "education" of the child; *e-duco*—I lead forth, that which is within. That teacher was leading the children out and on and on into self-

¹ Foreword to *Little Plays for Little People*.

² *Plays for School Children*.

expression. All the instruction of a lifetime will not be worth while unless the one so instructed can give out again in fuller measure what has been poured in. So it is that "Knowledge grows from more to more". The children in that class are being educated. Would that there were more teachers who understood how to do this kind of teaching.'

Miss Knox adds to this: 'Our aim has been not only to train the children to read, write, and speak the English language well, but we have kept constantly before us the higher aim of attaining fine, rich culture, and the building up of a well-disciplined, worthy character.'

The ability to speak well and easily, with correct pronunciation, clear enunciation, with voices well modulated and truly expressive is one of the more obvious gains from play production. There is a strong carry-over into other classes, so that teachers reap the benefit in more intelligent answers and understanding. That children gain poise and self-control when meeting strangers, and can more easily adjust themselves to new situations is a proved fact.

The change in attitude in the classroom is one of the gains to be deeply appreciated by the teacher. Instead of whispering and window-gazing by the majority of the class when one pupil is reciting a stereotyped drill of facts in a monotonous voice, there is eager participation and enthusiastic interest. This is due not only to the fact that the information is more ornately dressed, but that the subject has suddenly become understandable in a more graphic way than ever before; and because the child's natural impulse toward creating something has found a normal outlet. In this thrill, that the children get themselves, is found the true value of dramatic teaching. For the time being the children lose their own identity and are lost in the characters that they are portraying, whether this be in the process of writing the play or in actually acting it. Such understanding as this must perforce broaden and deepen and inspire them to greater things, both morally and mentally.

Apart from the actual grammar and composition forms learned, play-writing calls for careful, alert thinking, and is an activity that may blend the play attitude with the work attitude by fostering an interest both in the activity and its results.

Classroom Plays vs. Stage Plays

One of the biggest obstacles to a fair trial of this method of teaching is in the attitude and expectations of the teachers. Having in mind the crude efforts at composition which weekly pile their desks, and the exceedingly long and elaborated dramas of their

experience, it is small wonder they feel the gap between the two impossible to bridge. And the solution to their problem may be the assurance that no bridge is needed or wanted. Classroom plays are for the classroom and not for the stage.

A play given in the classroom as a part of the school curriculum, is really a sort of glorified recitation. For the Primary school it means little more than acting out nursery rhymes or reading-book jingles. Children will learn to read with greater interest if they can actually be the pussy cat who visits the Queen in London and frightens a mouse under her chair. If the older children can act out the stories in their reading-books, does it not prove whether or not they have understood them? This is especially true in teaching and learning foreign languages. Instead of the usual questions of what did the boy do, where did he go, what did he see, give the class the opportunity of the pupils being the boy who went to tea with his friend. Sentence building and vocabulary work are stimulated and learned by letting the pupils use their own words and express their own thoughts about the story, in a play-acting form.

Obviously the standard of composition will be faulty. But the teacher must remember that he is not aiming to produce a finished production of two or three hours. Rather he is aiming to teach history, or language, or geography in a graphic way. The little play of only a few minutes or a few pages is for the pupils in the classroom. It is not for the amusement-seeking public! Sometimes the pupils do write plays which last half an hour, and which are worth presenting to the whole school. These are the exceptions rather than the rule.

It may be that our terminology is at fault, and that the dignified word 'play' brings too much with it. By courtesy, and because of the lack of a more specific word, these classroom efforts are called plays. The teacher must keep in mind the true goal and not let himself be side-tracked.

Untrained Teachers

It is quite true that without some experience in this method of teaching results are not always what they should be. No school is going to be provided to teach this method, although it should be introduced into the curriculum of every Training College. Any enthusiastic teacher can, nevertheless, make a careful and modest beginning with small children in small jingles, and thus begin to build up experience sufficient to embolden him to more courageous efforts. Any teacher with enthusiasm and ingenuity can begin in a small way to educate himself and his pupils to a new way of

approach. There are so very few teachers in any school who have never had to help out with anniversary or school day functions. Practically every teacher has some background for dramatics. His danger will be that he will offer his ideas to the pupils, instead of sitting quietly by and letting them carry out their ideas in a natural, unaffected, untheatrical manner. Classroom plays are not theatricals. Classroom plays are of the children, for the children, and by the children. The teacher is a critic, who considers the experience and years of his actors and playwrights, the goal he has set for them; the guarding encyclopædia who sees that facts and usages are accurate.

Can We Use the Dramatic Method in Our Village Schools?

Adapted, yes. Conditions of curriculum, inspections, and pupils being what they are, it is probably only in certain schools, possibly privately owned ones just at present, where this method can be adopted. It is my considered opinion that it can be adapted in many schools.

My suggestion is that the dramatic idea be taken. If one teacher teaches all the subjects for one class or form, his task of planning out the work is simplified. If, on the other hand, special teachers teach special subjects, so that one group of pupils may have several teachers, a great deal of co-operative planning will be required.

Suppose, for instance, that one week the history lesson should be the discovery of America by Columbus. Let this become the project of all classes for that week. The history class studies the facts relating to Columbus' search for funds, his plea before Isabella, her giving up her jewels, the meeting of the sailors on board, the final sighting of land, and the consequences of this discovery to the Government of Spain, and so on. The language class should write descriptions, narrations, conversations, even rhymes on this subject. Every opportunity will be given for the teaching of grammar. The geography class studies Spain, Italy and surrounding countries; America; and the relationship of new discoveries, exports and imports, to Spain and her neighbours. The arithmetic class finds out how much money Isabella gave Columbus, when she gave him so many pearls valued at so much; how many miles Columbus sailed, if he sailed so many miles a day for so many days. The drawing class studies ships and sails, costumes or jewel designs. The spelling class learns how to spell words dealing with this great adventure. The reading class reads the story aloud, and finds extra information about Columbus or the Court of Spain.

Let the project stop there, without a further writing of a little play and acting it, if it seems impossible to do this. The pupils have had this subject presented to them in so many different ways that their facts have been easily learned and the requirements for examination questions have been fulfilled. Moreover, many of the values of dramatic teaching have been gained: greater interest and enthusiasm aroused, imagination stimulated, self-expression fostered, response made more intelligent. The acting is needed, of course, if the values of good speech, voice and poise are to be gained. And after a few lessons based on such projects, I feel the next step of acting would follow normally and naturally.

Instances of such co-operative work within the present curriculum will soon suggest themselves many times over to any group of teachers who are willing to spend a little time in planning out a dramatic project like this. The rewards they will reap in keener pupils and easier work will repay them. Even when obstacles are greatest, much really constructive help can be found and utilized from a working of this method of teaching. So many schools have found it eminently worth doing, that its value needs no further proving. If some schools, then why not all? A good thing is at hand. Why not use it?

EMILY GILCHRIEST HATCH

THE TEACHING OF SANSKRIT. II¹

THE application of these principles of the new method to the teaching of Sanskrit presupposes a new syllabus. The syllabus now prescribed, for example, by the Bombay Educational Department, is very old indeed and quite out of date. It was framed on the basis of Dr. Bhandarkar's books. *Sandhi* rules, declension of simple nouns, conjugation of simple roots, in the present and imperfect tenses, imperative and potential moods and translation of simple sentences form the course for the first year. Here no mention of reading, recitation or writing is made. In the second year the declension of more difficult nouns and pronouns and the conjugation of difficult roots are to be chiefly done. The translation of sentences given to illustrate the grammar rules is all that can be said to have any reference to literature as such. Nothing is said about exercises like sentence-formation or devices like dramatization. The third year students are to learn tenses like the perfect and future and something of numerals and compounds; they have

¹ The first part of this article appeared in the September 1932 number of TEACHING.

to read some pages of Sanskrit prose and some lines of Sanskrit poetry. Here composition is left out of account, and the appreciation of poetry is not even suggested. For the fourth year the remaining portion of grammar from Dr. Bhandarkar's Book II and some more reading and recitation has been prescribed. Rapid reading is not recommended anywhere in the syllabus, and project-work not even thought of. On the whole, this syllabus is too dry and in it Sanskrit is not treated as a language. There is nothing in it to stimulate any living interest in the subject. It gives no guidance to the teacher in his work. It suggests no devices or methods of procedure. It gives the most importance to grammar rules and the least importance to literature. It offers only the 'dry bones' of the language to beginners, who are assumed to be unfit to do any reading or recitation! It does not recognize the value of written work. It divides grammar into watertight compartments and deprives the language study of its reality and beauty; for example, simple compounds and numerals may be used even in the first or second year during the course of literature, and pupils can understand them fairly readily, though formal lessons on those grammar portions may be given later.

The following is a framework of a new syllabus in Sanskrit. It is proposed to begin Sanskrit in the third year of the Secondary school and to carry it on to the seventh year, thus making up a full-grade course of five years. Usually a class reads Sanskrit for five periods in the week, but three periods will be enough for the third standard.

First Year or Third Standard

1. Oral work on topics like everyday actions, limbs of the body, the classroom, the school house, the garden, the playground, the sun, the moon, the sky, a hermitage, the cow and other domestic animals, the peacock and other birds, the lion and other wild animals, etc.

2. Stories and dialogues about animals, and from mythology (about a dozen).

3. Reading descriptions of the topics in 1 and of the stories and dialogues in 2; care being taken to ensure correct pronunciation and proper intonation through phonetic drill.

4. Dramatization of the stories and dialogues read.

5. Recitation of simple descriptive verses and action songs (about 100 lines); proper tunes must be used in this.

6. Written work in the form of transcription from the book, or blackboard and dictation.

7. Simple exercises in sentence-formation.

Second Year or Fourth Standard

1. Oral work on concrete topics like 'a river', 'a tree', 'a town', 'a temple', etc.

2. Dialogues on interesting subjects of everyday life between 'teacher and pupil', 'father and son', 'friends and friends', 'brother and sister', etc.

3. Stories about animals and from mythology.

4. Reading and dramatization of 1, 2 and 3, with proper attention to pronunciation and intonation (about 50 pages). Regular phonetic drill to be given every day.

5. Recitation of simple descriptive verses like *Subhasitas* to proper tunes (about 150 lines).

6. Written work in the form of transcription and dictation. Attention to be paid to accuracy, letter-formation and neatness.

7. Simple exercises in sentence-formation, vocabulary-building, and silent reading, with automatic understanding.

8. Grammar: declension of nouns ending in vowels and pronouns like अस्मद्—यस्मद्—एतद्—इदम् तद्—; conjugation in the present, imperfect, imperative and potential of roots of the 1st, 4th, 6th and 10th conjugations.

Passive and active constructions; use of adjectives and adverbs; and *sandhis*. Lessons on such topics should be inductively given; copious illustrations should be elicited and their application to literature suggested.

Third Year or Fifth Standard

1. *Prose*. Slightly more difficult stories and descriptive lessons, with some biographies of great men and model types of letter-writing (about 75 pages). Intelligent reading with thorough understanding.

2. *Poetry*. A few poems written in simple style on descriptive and narrative topics (about 200 lines). Recitation to good tunes with understanding. A general approach to the appreciation of poetry—first the beauty of form and then the beauty of thought—to be explained.

3. *Composition*. Simple exercises, like descriptions of pictures or objects or places, and reproductions of stories read (about 20 during the year).

4. *Grammar*. Declension of nouns ending in consonants and pronouns like सर्वम्—अदस्—यत्—किम्, etc.; roots of 2nd, 3rd, 5th, 7th, 8th, 9th conjugations; participles, present, past, passive and active; simple compounds and numerals; use of difficult adjectives and adverbs; use of prefixes to roots, etc. Lessons to be given inductively.

5. More difficult exercises in sentence formation, changes in constructions, vocabulary-building and silent reading with automatic understanding. Utility of *amarkosha* to be shown.

6. Project work to be done by pupils as directed by the teacher, e.g. illustrated stories from *Ramacharita* or *Krishnacharita*; collection of verses on particular topics like the sun, the moon, the sea, etc., or selection of fables about particular animals like the fox, the lion, etc.; a collection of printed pictures, their arrangement and description, or of letters.

Fourth Year or Sixth Standard

1. *Prose*. Selections from classical works of a representative nature, showing a variety of topics in which the pupils can feel interested (about 100 pages). Intelligent reading with thorough understanding.

2. *Poetry*. Selections from classical works like *Raghuwansha*, *Ramayan* and *Mahabharat* (about 300 lines). Recitation to good tunes with understanding. Appreciation of expression and idea to be encouraged rather than literal paraphrase; elementary notions of *rasas* and simple *alankaras*.

3. *Composition*. Exercises in reproduction and free composition on topics of classical interest. Writing of letters, dialogues and verses to be encouraged. About 20 exercises during the year.

4. *Translation*. From Sanskrit into vernacular and vice versa, with a view to gain critical insight into the structure of the languages; translation and re-translation to be practised as an art.

5. *Grammar*. Declension of irregular nouns and pronouns; perfect and future and conditional (recognition and use only); causal construction; comparison of adjectives and of adverbs; difficult compounds and numerals; desideratives and denominatives. Lessons to be inductively given and their application to literature to be drilled.

6. *Project Work*. Examples of *rasas* and *alankaras* to be collected with necessary illustrations; charts of adjectives, *sandhis*, participles, etc.; collections of proverbs in some order; and the like.

7. A book of about 50 pages for rapid reading; e.g. some play of Bhasa.

Fifth Year or Seventh Standard

1. *Prose*. Selections from more difficult classical works, fewer in number but longer in extent (Kalidasa, Bhavabhuti, Bana, Harsha, Jaydeo, about 100 pages). Intelligent reading with thorough understanding and appreciation of style and the study of characters.

2. *Poetry*. Selections from classical poetry (Kalidasa, Jagannath, Magha, etc., about 400 lines). Tuneful recitation with understanding and appreciation of the form and of thought, of *rasas* and *alankaras*. No literal paraphrase or dissection to be attempted.

3. *Composition*. Free composition on descriptive and narrative topics; letter-writing, dialogues and versification to be encouraged (about 20 exercises). Composite composition at times.

4. *Translation*. To be practised as an art from Sanskrit into vernacular and vice versa. Retranslation exercises for idiomatic rendering. Free translation to be encouraged rather than literal.

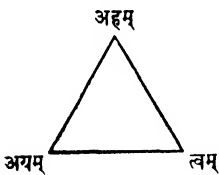
5. *Grammar*. Revision of the declension of nouns and conjugation of verbs; aorist, benedictive and frequentative (recognition and use only); idiomatic use of cases; rules of feminine bases; participles and indeclinables; comparison of adjectives and adverbs; use of prefixes to roots.

6. *Project Work*. Illustrations of *rasas* and *alankaras*; collections of poems or passages on particular topics; selections to exemplify particular styles; critical study of some work; discussion of some author's style and merits, etc.

7. A *book* of about 75 pages for rapid reading; to have a fair combination of intensive and extensive study.

Practical Hints (Elementary Stage)

At the outset the teacher should have a talk in the pupils' vernacular about the usefulness of the study of Sanskrit. Their patriotic spirit should be roused in so far as the Aryan culture is to be seen in Sanskrit works; their religious enthusiasm should be stimulated in so far as the principles of the Hindu religion have been originally expressed in Sanskrit; and their æsthetic sense should be awakened to read Sanskrit literature, which is of worldwide fame, replete with wisdom and beauty, and with ideal characters like Rama, Krishna, Sita and Savitri. Having thus prepared the pupils' minds to receive the new language-material, the teacher should begin his first lesson. For this he has to secure the help of an assistant to let the class hear spoken Sanskrit, and chiefly to make them understand the use of the personal pronouns. The procedure is something like a movement along the sides of a triangle, the teacher first addressing the assistant in the second person and the pupil in the third person. Then he can vary the procedure and address the pupil, who will now automatically take part in the conversation.



Every new word and phrase must be introduced by the teacher

in direct association with actual objects or actions. He enunciates it two or three times, makes the class repeat it simultaneously two or three times, and then writes it on the blackboard. In the early stage of instruction no new word, form or phrase can be elicited from the class. The teacher should never attempt it, should never set the class a-guessing; because they can never do it rightly. In the initial stage the language must be learnt by imitation—by reception and reproduction, and never by investigation. The similarity between some Sanskrit words and some vernacular words cannot be a strong argument in favour of guesswork by the pupils; because Sanskrit is peculiar in the inflexions of words and nobody can hit the right point by chance or accident. If the learner is encouraged to do such guesswork, he is sure to get into bad habits of articulation, of semantics and of pidgin speech.

Sanskrit script is phonetic: in it the name of the letter is identical with its pronunciation, each letter has the same pronunciation everywhere for all practical purposes, and there is no question of any letter being silent in any word. Thus spoken Sanskrit is easier to teach than spoken English. Still Sanskrit phonetics requires great attention and careful handling. The pronunciation of gutturals, linguals, palatals, dentals, sibilants, aspirates, etc., must be thoroughly practised. The difference between hard and soft consonants, and long and short vowels; श—ष—स, ण—न, ड्—ञ, प—फ, क—ख, च—छ, त—थ, ट—ठ, ग—घ, ज—झ, द—ध, ब—भ, ड—थ, etc., require exact articulation. Conjunct consonants are more frequent in Sanskrit than in any vernacular; and the preceding short vowels are stressed. Sanskrit ज—झ and च—छ are very different from the vernacular ज—झ and च—छ. The nasals are to be read in relation to the following letter: सवृत—सगर (सङ्गर)—सयम—सतान (सन्तान)—सजय (सञ्जय)—सपात (सम्पात)—सदत—सऊन; in these words the original nasal म् is read differently so that it corresponds with the next letter. The same rule holds good in reading a nasal at the end of a word 'अतिभूमि गतः'—अतिभूमि प्राप्तः—अतिभूमि नातः of these, in the first phrase the nasal is pronounced as ह, in the second as न्, and in the third as न. *Visarga* at the end of some forms is a special feature of Sanskrit inflexions. Very often it is wrongly read as ह or हा. Its pronunciation after short vowels is short, and after long vowels long. When it is followed by a hard consonant or a sibilant its pronunciation is merged into the following letter. In pronouncing forms like वदामि—धावति—नभसि, etc., pupils wrongly elongate the last vowel. They should be instructed to stress the penultimate syllable a little, to correct this. Another wrong tendency of the pupils is to read the last न—म—क—त—etc., as न्—म्—क्—त्—etc., or as नऽ—मऽ—कऽ—तऽ—etc.; thus मुखेन will be read as मुखेन् or as मकेनऽ. This habit is due

to the mode of vernacular pronunciation, and has to be corrected from the very beginning.

As soon as a new word is introduced, and has been spoken several times clearly and distinctly by the teacher, the class should repeat it simultaneously two or three times, and then individual backward boys should repeat it. All this phonetic drill must be done very accurately. It does not matter if at this stage the syllables are stressed a little more than usual; but the beginners must hear the forms rightly and must reproduce them unmistakably. This foundation of phonetics must be very well laid. The teacher and the taught must remain true to the tradition of Sanskrit, remembering how beautifully the *shastris* read and recite Sanskrit texts. The teacher's voice must be quite clearly audible and attractive. His speech should be a model for the pupils to copy. His manner must be cheerful, confident and inspiring. His ear must be very keen, and he should be able to detect the slightest mistake made in pronunciation. Even in chorus repetition he should be able to mark and locate shirkers and defaulters, and to exact from them the right kind of work. He must be sympathetic and at the same time firm, paying greater attention to those who sit farthest from him.

The teacher should have ready before him the whole plan of his work to be done during the year, and carry on lessons accordingly. A good textbook is to be considered a great asset. And the teacher will do well in following the plan of my *New Sanskrit Readers* (published by Messrs. Macmillan & Co., Bombay). The lessons in these books are well graded and the exercises given at the end of each lesson suggest the line of treatment to be followed; proportionate attention is paid therein to the different aspects of the language study; and literature (connected descriptions, stories and dialogues) is given the first preference.

In an oral lesson on some concrete topic, the teacher first introduces the new words and phrases one by one in immediate association with the necessary object or action. Then the class repeats them in chorus and they are written on the blackboard. When this is done the pupils' understanding of the unit is expected to be fairly clear. They have heard the sound and repeated it, they have inferred the meaning and associated it with the word, and they have seen the symbol to be copied a little later. After this oral work is done the teacher should give the model reading of the same. The class hears it and reads simultaneously after him. Here great care has to be taken with pronunciation and intonation. The right kind of intonation must be drilled from the very beginning. Different intonation is required for a statement, for a question, for

an order, for an exclamation, etc. It also varies with the importance of a word in a sentence. It varies with the sentiment to be expressed. It varies with the different pauses to be made. All this the teacher must show in his own reading, and the class will imitate him. There must be briskness in the work, no dullness or monotony, and it is sure to stimulate the intelligence of the young learner. The reading as well as the speech should be neither too slow nor too fast. The normal fluency—about five words per second—should be used from the beginning. This will inhibit the pupils' tendency to translate, and will promote the habit of automatic understanding. The next step will include questions on the portion read. The teacher should begin with very simple questions, put them briskly and proceed logically. The usual directions about questioning must be strictly observed. Orders like 'point out', 'show by action', etc., should be given at intervals, to avoid the monotony of questioning and to keep the pupils physically active. Good answers should be repeated by the class simultaneously and by backward pupils individually. Such repetition is very effective as a fixing device. It is more interesting than learning by rote strings of words or phrases at home. The gregarious instinct of the pupil is exploited here, and he does the same thing more cheerfully, more quickly, and more successfully in the company of his comrades than while sitting alone at home. The chorus repetition, especially, enlivens the whole class at once, offers work for all simultaneously (thus effecting an economy of time and labour on the part of the teacher) and creates confidence in the minds of the beginners. The last step in the lesson will consist of some application exercises. The class may be asked, for instance, to transcribe a few lines from the lesson just read: to fill in the gaps in given sentences; to arrange given word-cards or sentence-cards according to instructions; or to re-arrange in the right order sentences given in the wrong order. Here the teacher should not tell anything new, but guide the class briskly through the exercise set.

Each lesson should include at least three or four steps, each step being complementary to the others; and all of them tending towards perfection. They will supply variety of work to the pupils. Variety means interest. By their very nature children like change, and such steps, presenting practically the same matter from various standpoints, are sure to be welcome to them. If one and the same step continues for the whole period, even for half an hour, they are sure to be disgusted with it, and lose all interest. The principle of variety is in keeping with children's instincts. Children prefer to gather the honey like bees, one drop from this flower, another from that.

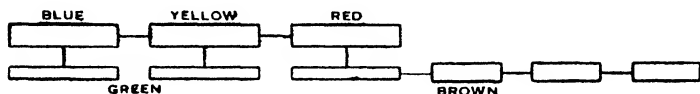
Stories are, perhaps, the most interesting part of the literature the pupils have to read. In the early stages the stories which they have read in the vernacular or in English may be told to them in Sanskrit; familiar matter in unfamiliar language—a great help to understand the latter. At the beginning of the lesson the key-words of the story should be introduced and the necessary phonetic drill should be given. A general discussion of the chief characters in it should be done along with it. Then the story should be told as clearly and vividly and concretely as possible. In doing this the teacher should use the necessary voice-modulation and gestures to let the class feel as though the story were in progress before them. In fact, he has to act the story to the class. In this way it should be told twice. Then the pupils can answer a few general questions put on it. The model reading of the same story from the text follows in quick succession—i.e. the class reading after the teacher. At times pictures illustrating the different stages in the story should be presented, and its thread should be brought out through questioning. Whatever devices are used in such lessons, there must be full scope for free co-operation by the class and sufficient stimulus for their self-expression.

A lesson in the form of a dialogue can be similarly treated. The only difference is that instead of story-telling the dialogue will be actually played before the class by the teacher with the help of his assistant. Having thus heard the dialogue, they will be able to answer questions on the same and follow its model reading.

The most useful device that can be employed in drilling such lessons is dramatization. Children always like to dramatize. They are often seen playing 'the teacher', 'the policeman', 'the old beggar', 'the soldier', and the like, almost instinctively when a favourable environment is found and enough freedom is allowed. The teacher can utilize this instinct with advantage and make them dramatize the stories and the dialogues they have read. This will, of course, be done in review lessons. The pupils should read or recite the speeches of the different characters intelligently, with the use of proper intonation and acting. All authorities agree on this point, that pupils must learn a good deal by heart while studying a classical language. For dramatization they have to learn a good many sentences by heart. They will do this willingly because of the spirit of play which is at the back of it. Through such activities they are likely to become self-confident in self-expression and get into the right attitude of learning the language.

The first lesson on any topic, story or dialogue is meant to give its general idea to the class, and is merely a formal introduction. One or two more lessons will have to be given on it to drive the

ideas and the expressions home to them. These are called review, or 'drill' lessons. Such a review lesson should begin with pupils' reading, should include detailed questioning and some explanations of difficult constructions (which will naturally be few in the lower classes) and should end with application exercises in sentence-formation, vocabulary-building and silent reading. Sentence formation is best taught with the help of boxes drawn on the black-board:



Here the blue 'box' is for the subject, the yellow for the object, the red for the verb, the green ones for the attributes of the subject and the object respectively, and the brown ones for the different extensions of the verb. If once the pupils know this, the procedure becomes very simple. The teacher supplies a proper word in any of the major 'boxes', and calls on the class to frame a full sentence containing it. Putting some questions further on, he gets the attributes and the extensions from the class. By changing the number, gender and tense interesting variations can be introduced in the exercise, and thus the pupils can get a good grasp of the structure of the language in general. To simplify matters a little the teacher should keep a number of word-cards ready in the beginning, and let the pupils choose the right ones from among them to complete a sentence. Or, to give it the appearance of a game (which is very appealing to young children), the class should be divided into two groups, each one proposing words and the other framing sentences, by turns. The group should get as many marks as the number of correct sentences it completes. A time-limit can be fixed for every turn, and at the end marks counted. Such exercises form a connecting link between literature and grammar: they are applied grammar in a sense.

Exercises in vocabulary-building are equally important and interesting. The simplest of these is 'words of the same family'. The class can be asked, for instance, to name all the articles of food known to them, all the parts of a tree, all the domestic animals, all wild animals, etc. Here just by association they can proceed from one thing to another. Another exercise consists of 'opposites': words like धनिकः—निम्नः—प्रकाशः etc., are supplied, and the pupils are called on to give their opposites in meaning. This is based on suggestion by contrast. A third exercise can be set in which words having similar sounds but different meanings are

[illegible]

१. उत्तिष्ठत । भुजौ उद्धरत । त्रिवारं च उत्पतत ।
२. उद्यानं गत्वा पीतं पर्णम् आनयत ।
३. नेत्रे निमील्य पार्श्वस्थस्य मिवस्य कर्णौ धृत्वा उत्तिष्ठत ।
४. क्रीडाङ्गणं गत्वा वानरवत् उत्पतत चीनारं च कुरुत ।

(To be concluded)

V. P. BOKIL

ASSIGNMENT FOR CLASS V¹

From 8-2-26 to 13-2-26

SINGLE TEACHER PRACTISING SCHOOL

Literature. 1. Invasion of Assam by the Ahoms. I shall give you a model lesson in reading on Monday. You will have to read to me on Wednesday, when I shall explain the difficult portions.

2. Note the following spellings: (Here follows a list of words.)

3. Learn the meaning of the following words and phrases: (Here again a list is given.)

4. Consult a map and find the following places: Burma, Patkai Hills, Kaliabar and Dimapur.

5. On Saturday show me the answers to the following questions, written on the slate:

From what place did the Ahoms originally come? What district lies to the east of Sibsagar? What is the name of the hills to the east of Assam? Where is the kingdom of Pung? Who was the first king of the Ahoms? Who among the Ahom kings gave the largest gifts to Brahmans and Pandits? Who was Turbak?

Poetry. I have explained to you the poem called 'Lará-Kál' (Boyhood); on Friday render it into prose for me, I shall question you on it.

Handwriting. Take a copy slip from me and write. Avoid scribbling.

Dictation. Take dictation Tuesday and Thursday from page 14 of the lesson for this week. The captain of class IV will dictate. I shall correct and mark.

Essay. We have already discussed railways in class. Write a short description on the lines already given.

Arithmetic. Do all the sums of examples 20 and 21 on your slate; those I have marked should be worked out in your book.

Mental Arithmetic. On Friday I shall give you hints by which you can easily find how, from the price of a seer, the price of a maund should be calculated. On that in the beginning you must work out on the slate the price of a maund, when the price of a seer is Re. 1-9-6, by multiplication.

Tables. Learn 15×20 and 16×20 ; and write it on your slate. I shall ask questions.

Accounts. Take an account sum from me and work it out; if time permits, I shall explain how the abstract of an account is to be made.

Geography. Read about the Sibsagar District from the

¹ See TEACHING, September, 1932.

Bhugol-Path. Draw a map, mark the three sub-divisions, all the important places given in the book, showing the thanas in red. Show it me on Saturday, when I shall question you.

Object Lesson and General Knowledge. I have already talked to you about the railway. Write an explanation of what a junction and a station are.

You have already learned something about the potato; write out, and let me see, what you know about it.

Drawing. Procure a leaf of the jack-fruit tree; draw it in its natural colours.

Handwork. Take scissors and paper from me and cut out two envelopes and a fan.

Work to be Shown to Teacher

- | | |
|--------------------------------|--------------------------------|
| 1. Exercise on literature. | 6. Arithmetic sums. |
| 2. Handwriting. | 7. Map. |
| 3. Dictation. | 8. Note on object lesson, etc. |
| 4. Essay. | 9. Drawing. |
| 5. Note on object lesson, etc. | 10. Handwork. |

S. C. GOSWAMI

CORRESPONDENCE

The Teaching of Sanskrit

SIR,—Will you permit me to make a suggestion to Mr. Bokil, and ask him for his opinion on it?

It is with a great deal of hesitation that I do so, as not only do I know no Sanskrit, but I have had no experience of teaching any classical language to a whole class. My earlier educational career was taken up with teaching mathematics, and that to more advanced pupils.

I have, however, had private pupils to coach in Latin. I employed a method gathered from my experience of teaching Mathematics, and with most satisfying results.

Formulae in trigonometry and conic sections are endless. Even when arrived at by personal work, they do not always get lodged in the memory in a way that makes them readily available when needed. Declensions and conjugations are a similar string of symbols, slightly differing in sound yet of vastly different meanings. They are so easy to confuse. Learning them by heart is a long and wearisome task.

I made my pupils keep cards with the various formulæ neatly written out. These I made them consult whenever in doubt during

the working out of an operation or problem. In a much shorter time than I had expected the cards were dropped, and the formulæ memorized without the effort of learning them by heart isolatedly. They were learned by being used.

Similarly, my private pupils had cards with the declensions and conjugations for easy reference when writing Latin, either as original work or translation. Here, too, the cards were soon found to be no longer necessary. The declensions and conjugations were learned by use.

This method does not make a pupil lazy, but eager to dispense with these aids to the beginner.

Mr. Bokil, *TEACHING*, September 1932, p. 29, says, 'In the teaching of Sanskrit grammar special care has to be taken to see that the pupils learn by heart the case-forms of nouns, pronouns and adjectives, and the conjugation of roots in the different tenses and moods.' Does Mr. Bokil think my suggestion of any value? I ask this with hesitation. Herein I speak as one less wise.

Yours truly,

'SCHOLEMASTER'

[Scholemaster's letter has been referred to Mr. Bokil.—ED.]

Contracted Method in Multiplication

SIR,—I read Mr. L. R. Desai's article, *Contracted Method in Multiplication*, in the June 1931 number of *TEACHING*, Mr. L. Krishnengar's criticism and Mr. Desai's reply (September 1931). I quite agree with Mr. Desai.

I have been using contracted methods of multiplication and division of decimals in the lower classes (V and VI) for several years with good results. My method, except for a slight change in retaining the figures, is the same as Mr. Desai's. This is my procedure;

$\begin{array}{r} \times \\ 123\cdot45678 \\ 3\cdot87256 \\ \hline 370\cdot3703 \\ 98\cdot7654 \\ 8\cdot6419 \\ \cdot2469 \\ \cdot0617 \\ \cdot0074 \\ \hline 478\cdot094 \end{array}$	<p>Retain two digits more in the new multiplicand than the answer requires, the last digit being approximate.</p>
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Put a mark at 8. Multiply by 3, taking the approximate carrying from 3×8 , i.e. 24; then cross out 8. Similarly take the approximate carrying from 8×7 ($56=6$) when multiplying by 8, and cross out 7. And so on.

Add the figures in the last line (36) and carry 4, and complete the addition. The answer will be 478·094, which is the approximate value to 3 decimal places of 478·0937879568.

REVIEWS

Education Information. Institute of Experimental Education, Forman Christian College, Lahore. Per copy, 2 annas.

Teachers will be naturally disposed to extend a welcome to this 'monthly bulletin of information and counsel', a welcome perhaps the more hearty because the journal is avowedly one that aims at the experimental handling of educational problems. A perusal of numbers 2 to 5 of the first volume, however, leaves a certain sense of disappointment. A Primer Word Study in the April issue represents the one attempt at experimental treatment in which a conclusion is reached, but there is little either in the process or conclusion that has not been said before. Apart from this, it is high time that some attempt was made to view this question of word-frequency, with which so many compilers of English Readers are concerned, in its true proportions. English is characteristically a language, not of isolated words, but of idiom, and the problem is the systematic and orderly presentation in Readers, not of disconnected words, but of units of expression, which include idiom and grammatical forms as well as disconnected words. A frequency list which includes disconnected words but ignores the more significant idiom is of little help to the teacher or learner.

Again, notwithstanding the conclusions arrived at in Dr. West's *Bilingualism*, it must be maintained that, in a country where ability to speak English is a sheer necessity to all educated men, it is the business of the schools to develop to the highest possible pitch the capacity to use English in speech and writing, as it is to develop reading capacity to its highest level. Any theory which seeks to assign a position of higher importance to reading ability than to the ability to speak and write English is, we believe, unsound as being out of touch with reality.

Last, modern research has not shaken the validity of the dictum that learning to speak a foreign language is the shortest road to learning to read it: the ability to speak and write English leads directly to reading ability, but reading ability does not lead directly to the ability to speak and write.

A clearer realization of these basic facts will be followed by a demand, not for the Thorndike Word List, which includes only isolated words and which is based largely upon reading matter, but for a frequency list of words and idiom based upon English as commonly spoken and written.

There is a good deal to be said for the 'deplorable attitude' of some teachers towards new methods, which forms the subject of an article in the June issue. A teacher who complains that new methods have impaired the intellectual efficiency of students, that these methods are designed to minimize individual efforts, or that the introduction of project and story methods in an infant class was unsuccessful, has a right to be listened to with respect instead of being dismissed as a person whose mind is closed to new ideas: he should, in the absence of evidence to the contrary, be given credit for an opinion sincerely and intelligently held. A method of teaching or learning that has met with success in a special school is not necessarily fit for transplantation to a

school organized and working on traditional lines. Here, it may be suggested, the truly scientific, experimental approach, and the approach most likely to achieve success, is one that takes full account of existing conditions in the schools, and, instead of seeking to oust traditional methods by new methods, aims at developing and liberalizing the traditional methods in the direction of the new. The Project Method in its pure form, for example, has little chance of success in a country where public examinations have a strong hold on teachers and students. The scientific attitude will not refer slightly to the 'general craze for passing University examinations'. It will recognize that preoccupation with examinations is inevitable in countries like India and Great Britain, where success in public examinations is a passport to the public service and professions. It will, in its approach to teacher and student, accept the conditions imposed by examinations; although it may legitimately attack the examinations themselves, it will not attack the teacher or student for his 'craze' for examinations. Education will be better served if its problems are approached in a more deliberative and critical vein.

It is perhaps superfluous to remark that these few criticisms are offered in a spirit of full sympathy with the aims and ideals of *Education Information*.

English Composition without Trouble. High School Course, in three parts. I, pp. 150; II, pp. 124, III, pp. 204. By F. G. FRENCH. Oxford University Press, Re. 1 each. 1932.

Some months ago Mr. French laid all teachers of junior classes in Anglo-Vernacular schools under a deep debt of gratitude to himself by giving them his *English Composition without Trouble*¹. Now he has extended the same benefit to teachers of English in the High School stage. There is only one objection I have to these books and that is their name, which gives a wrong impression, especially to those who do not understand modern methods and are apt to scoff at them. So beautifully graded and thorough are the exercises in these books that an enormous amount of trouble must have gone to their making. The pupil who works through them will also have to exert himself; but as he works through each example he will feel an added sense of power and achievement, for the work he is called upon to do appeals to his intelligence, leads him on from step to step so that his opportunity for error is of the least, and he will moreover acquire a command over the essentials of the English language.

The use of substitution tables is an important feature of these books. Until you have tried such tables you cannot realize what a great saving of time in the practice of special forms they can be. It is wearisome for a class to repeat a certain sentence to fix the type in their minds, but give them a table from which they can make up a hundred and fifty to two hundred such sentences and read them round the class, and they are not bored; while they hear so many sentences of the same type that even the weakest can't help remembering. These substitution tables are coming to take a great place in modern language teaching, though I know of no books used in India that have as yet introduced them. Those of us teachers that have adopted this method can vouch for the results achieved by it.

¹ The Middle School Course was reviewed in *TEACHING*, Vol. III, p. 189.

Composition, says Ballard, is a matter of words, ideas and the arrangement of those ideas; and to all three of these aspects Mr. French attends very carefully. His word lists are exhaustive and interestingly arranged. Even if one half of these remained in the memories of our schoolboys what a long road we should have covered. Why, there are many graduates of Indian universities who are ignorant of many of them!

The exercises for connected writing, especially for paragraph-writing, are fresh and in some cases even thrilling, especially in those that arise out of diagrams, which so far have been rigorously excluded from the language class and used mechanically in the science and mathematics classes. So again are the topics for argument of vital interest. It is a pity that in the formal 'essay' Mr. French has in many cases fallen back on the old stock subjects.

I may confess that I annexed an advance copy many months ago. Not only have I found it most exhilarating to use, but one or two of my more intelligent vernacular language teachers have adopted some of the exercises and used them in their Primary classes.

No teachers' library should be without these books. I would recommend every teacher to acquire a set somehow for his own private use.

Little Plays from Indian History (Dramatic Dialogue Readers). Three books. By E. LUCIA TURNBULL. I, pp. 86 (1931); II, pp. 84 (1931); III, pp. 81 (1932). Oxford University Press. As. 8 each.

The use of drama in education is now a recognized principle, not only in the education of small children but of adults also. This principle Mrs. Turnbull has brought into practice in these small books, which would make admirable extra readers for classes.

Those of us who have had the privilege of helping with Mrs. Turnbull's activities know that hers is no drama written without consideration of the exigencies of the stage and the available talent among small people, for her little dialogues are meant to be produced by quite average school children.

Here are dialogues based on the great days of Ind, bringing before us her heroes and heroines, her saints and warriors, as they moved and acted in their not necessarily greater historical moments—for some of these dialogues are based not on what actually happened and was recorded, but on what might have and probably did happen, but was considered too trivial for the historian to attend to.

These books should not only be useful in Indian schools, but I would recommend them still more to European and Anglo-Indian schools, who learn very little Indian history and whose children are strangely ignorant of the great men and women of the land in which most of them will pass their entire lives. It might counteract the fallacious notion that most of these young people have of Indians, as either political agitators or servants.

For school displays and prize-givings also, apart from the classroom, these little books would be invaluable. We strongly recommend them to all teachers in India.

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On 11/11/2010, the following information was received from the Department of the Environment and Heritage:

The work is extremely well done and I think is the best of its kind for a beginner's end. See end of 12 below as seen in British Museum and in General and State of the State, also in the

For the first time, a scholar has been able to compare manuscript versions of a single text and to see how they differ. The author, Jeremiah Blumhardt, c. 11, 11, 500 pages, the text covers 120, and the reader is provided by many illustrations, two of which are of unusual interest, which are reproduced from the original. The book is a study of the Greek, Latin, and other manuscripts and passages, which are the basis for the text. The author, Blumhardt, and the text are the basis for the text. The author, Blumhardt, and the text are the basis for the text.

The author's simple lucid and interesting style is well suited to the young minds for whom the book is intended.

Ashtabula County Council and Board of Health, Ashtabula

The author has taken every care to see that the book is written in most satisfactory style of the Hindi found in the standard of the Bombay University and the illustrations, which are a great show of originality, that the student world will find equally beneficial to its careful reading. It is a pleasure to note that it is written in a very simple Gujarati. P. R. JAVIER, B.A., B.P.T.D. (Lond.) Headmaster, Municipal High School, Bors'.

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